Moreover, even if packet switch functions themselves were not deemed to be "necessary" for interconnection or unbundled network elements – an inappropriate outcome in light of the assembled evidence – such functions are nevertheless routinely integrated into a single piece of equipment with transmission functions that are unquestionably "necessary." Thus precluding collocation of such packet switch functions would be unlawfully discriminatory for the reasons discussed above. As Tachion, a manufacturer, observes (at 2), "advances in integration and processing capabilities" have permitted it to design a product that combines switching, routing, transport, digital access cross connect system ("DACS"), signaling, and service creation functionality in a single standard central office rack." *See also* Nortel at 2-3. Moreover, as Tachion states (at 2), "this set of functionality does not come from combining separate devices in a single chassis, but rather comprises a fully integrated design, from the ground up." Critically, as Qwest shows (at 9-10), "[a] rule that would preclude CLECs from deploying any or all of the additional functions of such multi-functional equipment could place CLECs at a material competitive disadvantage by forcing them to backhaul traffic for switching and other functions, and in some cases require the purchase of duplicate equipment," which would "as a practical matter disrupt services and competition because the failure to utilize all of the power of new equipment would artificially impose inefficiencies on some CLECs."[31] Moreover, as AT&T noted (at 19 n.7), the Commission's decision in the *UNE Remand Order* not to require unbundling of packet switching was expressly premised on the Commission's findings that new entrants were able to self-provide such functionality by using collocation arrangements.

[31] *See also* Connectiv at 8-9 ("[a]rtificially 'dis-integrating' technology or forcing new carriers not to use available functionality in collocated products would create an enormous barrier to competition by CLECs"); Joint Commenters at 32 (absent collocation of multi-funciton equipment, "ILECs will be capable of discriminating" against CLECs because "they will be able

UNE Remand Order ¶¶ 313-17. Therefore, if the Commission were now to conclude that new entrants are *prohibited* from collocating such functions (as it should not), the Commission would have to reconsider its decision not to order unbundling of packet switching under the "impairment" standard of Section 251(d)(2).[32]

The Commission should also require collocation of circuit switch functionality. First, as a number of commenters note, circuit switch functionality can be integrated with transmission functions in relatively small equipment that fits within a standard collocation cage. Just as with packet switching, circuit switch equipment may perform multiplexing and concentration functions that facilitate a competitive LEC's access to unbundled loops, as well as provide a switching functionality between customers served from the same central office. As AT&T showed (at 27), a single RSM can replace multiple DLCs, and depending on the size of the footprint served from that central office, the RSM is likely to be no bigger, and perhaps even *smaller*, than the multiple DLCs it is replacing. Therefore, as many commenters recognize, an incumbent LEC's prohibition on collocation of equipment containing circuit switch functionality would be discriminatory and anticompetitive.[33]

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to install and use the most efficient technology and equipment" that would be unavailable to CLECs.).

[32] RCN at 12 (New equipment and services such as DSL, line sharing, and next-generation DLC systems are increasingly essential to CLECs' ability to compete, giving incumbent LECs "substantial opportunity . . . to exclude competition with network design choices that favor themselves or their advanced services affiliate.").

[33] RCN at 14 (Allowing incumbents to "[d]eny[] CLECs the right to collocate advanced services equipment would effectively thwart CLEC's ability to compete."); Joint Commenters at 32 ("ILECs will be given an enhanced, if not inherent, ability to discriminate against CLECs" simply by denying them access to the most cost-effective technologies and equipment).

Circuit switch functionality, like packet switch functionality, also can be "necessary" for interconnection or access to unbundled network elements in certain circumstances. Indeed, collocation of circuit switching may be critical to a carrier's decision to serve more rural and more heavily residential offices where calling is more heavily concentrated within the wire center, because the alternative of establishing backhaul facilities is prohibitively expensive. Likewise, in a situation where a CLEC is seeking to compete in an urban setting against an ILEC serving the customer with Centrex service over short loops, the only practical means to compete may be through deployment of circuit switching in collocation. Finally, certain large customers may require that their locations not be broadly vulnerable to a switch failure that might occur if a CLEC was employing a single centralized point of switching. In such cases, the collocation of circuit switching in ILEC offices may be the only alternative available through which a CLEC can meet that customer's needs. *See* AT&T at 15.

Of course, circuit switching functionality would not *always* be subject to collocation. For example, no party has suggested that a CLEC can collocate a full-blown 5ESS switch. Rather, circuit switch functionality may be collocated only when such collocation satisfies the statutory standards. In other words, switch functionality delivered through circuit-switched technology may be collocated: (1) when "necessary" to accomplish a material increase in the efficiency of the transmission functions handling the traffic originating and terminating from that central office, or (2) when the circuit switch function is integrated as an additional functionality in equipment that is otherwise collocable and fits within a standard collocation space (in which case precluding collocation would be unjust, unreasonable, and discriminatory). Indeed, distinguishing switch functions for purposes of collocation solely on the basis of the technology used – *i.e.*, packet switch vs. circuit switch – would place the Commission in the

untenable position of picking technological winners and losers. The Commission should continue to allow the market to determine the appropriate direction of technological development.

3. Cross-Connects. The commenters also agree that CLEC-to-CLEC cross-connects should be permitted.[34] Although the incumbent LECs, and in particular SBC, disagree, none of the incumbents can rebut the commenters' showings that the antidiscrimination requirements of Section 251(c)(3) require incumbents to allow cross-connects as a "just and reasonable" term of collocation. Similarly, the incumbent LECs do not – and, indeed, cannot – refute the substantial showings made by AT&T and others that connections outside the central office are so expensive as to make certain services prohibitively expensive, and are therefore necessary for access to unbundled network elements in the context of line sharing.[35]

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[34] *See, e.g.,* Qwest at 16 ("Qwest does not believe that it would be just and reasonable to deny a collocator, who otherwise meets the 'necessary' standard, additional incidental (and reasonable) uses of the collocation space, such as cross-connects to other CLECs that are otherwise lawfully collocated in that central office."); Corecomm at 29 ("Denial of cross-connection would violate the requirement that ILECs provide collocation on a nondiscriminatory basis, because ILECs can and typically do connect with a collocating CLEC at the ILEC's central office, but another CLEC could not. Of particular concern is that the inability to directly cross-connect with other collocated CLECs would effectively thwart CLEC advanced optical networking initiatives that use dark fiber capacity leased from other carriers because adequate optical cross-connect services from ILECs are either unavailable and/or would degrade the quality of service that CLECs are able to provide in comparison to direct cross-connection between CLECs."); Lightbonding at 3 ("The inability of CLECs to collocate on ILEC premises for the purpose of cross-connecting with other CLECs will effectively prohibit many CLECs from having access to advanced optical network and transport services currently under development."); Rhythms at 27-30; Connectiv at 19-20; RCN at 15-16; and see GSA at 12 ("GSA urges the Commission to find that incumbent LECs should allow multiple collocators to interconnect directly with each other within their central offices, but incumbent LECs should not be generally required to provide interconnections through their own facilities or equipment.").

[35] NorthPoint at 12 ("Without the ability to cross-connect its collocated equipment to a CTP in [certain] offices, NorthPoint would not be able to serve ISPs with end user customers in those

As AT&T has previously demonstrated, the statute provides two independent grounds for requiring cross-connects. *First*, the Commission has ample authority to require incumbent LECs to allow cross-connects as a just, reasonable, and nondiscriminatory term of collocation.[36] The incumbents cannot seriously dispute that their duty to provide collocation carries with it the ancillary obligation that such collocation be provided on just, reasonable, and nondiscriminatory terms.[37] This nondiscrimination requirement necessarily encompasses cross-connects, and an incumbent's attempt to deny that right would be inherently discriminatory and unreasonable. Indeed, if the incumbent can deny CLECs the opportunity to cross-connect, the incumbent would be the only LEC permitted to interconnect with all other CLECs within the central office.

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offices."); Rhythms at 28 (Absent cross-connects "efficient and effective interconnection would be precluded"); RCN at 16 ("[C]ross-connection is vital to CLECs' ability to compete").

[36] *See Local Competition Order* ¶ 594; *cf. Collocation Order* ¶ 34. *See also, e.g.,* NorthPoint at 9-10 (explaining authority and rationale for crossconnect requirement); LightBonding at 5 ("[T]he structure, plain language, and purpose of the Act make clear that section 251(c)(6) requires that incumbents allow competitive providers to interconnect with each other directly while collocated in the ILEC facilities."); Broad authority to prevent discrimination: Connectiv at 4 ("[T]he courts have not only upheld this Commission's broad authority to define the scope of unreasonable discrimination unded Section 202(a) of [the Act], but they have affirmed this Commission's authority to fashion remedies for such discrimination . . . through the Commission's authority to prescribe just and reasonable terms and conditions of service.").

[37] For example, the usefulness of collocation arrangements would be substantially impaired absent an implied easement for CLEC workers to enter the central office to maintain their collocated equipment. *See, e.g,,* LightBonding at 6 ("Had Congress intended to restrict the scope of permissible collocation required in the ILECs' premises under section 251(c), it would have also expressly limited the duty it had already created in Section 251(a)(1) to interconnect both directly and indirectly."); Covad at 26 ("Commission must conclude that a collocating carrier is permitted, pursuant to section 251(c)(6), to interconnect with another collocating carrier, in the central office, by cross-connect or any other technically feasible means of that carrier's choice."); Rhythms at 28 ("Section 251(c)(6)'s obligation . . . extends to carrier-to-carrier cross connects."); NorthPoint at 11 (Collocation right would be rendered "meaningless without the ability to connect [certain collocated equipment]" by means of cross-connects.).

Second, cross-connects are increasingly "necessary" for access to unbundled network elements. As line-splitting arrangements between LECs become more common, it becomes increasingly important for CLECs providing distinct services to have access to the features, functionalities, and capabilities of the unbundled loop by means of line-sharing.[38] Line-line splitting, however, requires the two LECs to split and route the traffic between separate networks.[39] As the commenters show, absent the ability to interconnect within the central office, two CLECs engaged in line-splitting would be forced to extend their lines and interconnect at some other location (or be limited to interconnecting only with the incumbent LEC).[40] The cost of interconnection outside the central office would effectively destroy the ability of the LECs to share the lines. Accordingly, cross-connects within the incumbent's premises are "necessary" for access to the full features and capabilities of the unbundled loop.

Finally, industry practice clearly demonstrates that CLEC-to-CLEC cross-connects are both practically necessary and feasible. For example, third party "collocation hotels" (which are under no legal obligation to do so) provide cross-connects between CLECs as an important "value-added" service.[41] This availability of cross-connects refutes any claims of

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[38] *See generally* Third Report and Order, *Deployment of Wireline Service Offering Advanced Telecommunications Capability*, CC Docket No. 98-147 and Fourth Report and Order, *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket No. 96-98, 14 FCC Rcd. 20912 (1999) ("*Line Sharing Order*").

[39] In fact, it is not uncommon for a single CLEC to require interconnection between its *own* non-contiguous collocation spaces for the same reason. *See NorthPoint* at 13 (necessary for a single CLEC to interconnect between its own non-contiguous collocation spaces within same central office). And, as noted by Rhythms at 28, it "uses the facilities of *several* CLECs in assembling its own competitive DSL network," which necessitates cross-connects.

[40] Rhythms at 29 ("If CLECs cannot cross connect with other CLECs in the ILEC premises, they do not have a nondiscriminatory ability to cross-connect.").

[41] Third-party collocators Switch & Data Facilities Co., AccessColo, and Colo.com are just three examples of collocators that find it not only feasible, but profitable, to themselves provide or, in

impracticality and infeasibility.[42] Moreover, as noted by Rhythms, forcing CLECs to interconnect indirectly "would be inefficient and require unnecessary installation of duplicative facilities and equipment, and in many cases would force competitors to use *more not less* [space in] ILEC facilities."[43]

4. Dark Fiber and Transport Provided By Non-Carriers. SBC (at 17-18) argues incorrectly that the Commission should not permit non-carrier providers of dark fiber and interoffice transport to collocate in incumbents' central offices. Specifically, SBC claims that one must be a telecommunications carrier in order to obtain collocation under Section 251(c)(6), but the plain language of the Act says otherwise. Section 251(c)(6) says simply that incumbents must permit collocation of "equipment necessary for interconnection or access to UNEs" – the Act does not specify that a collocator must be a telecommunications carrier. While only telecommunications carriers may obtain interconnection under Section 251(c)(2) and access to unbundled network elements under Section 251(c)(3), there is no reason why non-carrier

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some cases, to allow self-provisioning of CLECs to cross-connects at their collocation facilities. *See* http://www.accesscolo.com/solutions/serv_spex/body.html (advertizing provision of cross-connect "Connection to carrier(s) of customer's choice and services offered by providers"); http://www.colo.com/english/solution/service_specs.htm ("Cross-connects are available in a variety of media."); http://www.switchfacilities.com/colocation.html ("By pre-running conduit, securing access rights, and providing key carriers with space for their network interface equipment inside our facilities, we allow customers and carriers to meet with the lowest possible marginal cost - and without cooling, power or security worries.").

[42] Moreover, as various commenters note, it is highly improbable that CLEC-to-CLEC cross-connects would "subject [ILECs] to any increased burdens since central offices are by their very nature designed for [accommodation of] running cabling and performing interconnection." Connectiv at 24.

[43] See Rhythms at 31 (explaining additional and unnecessary costs.); Joint Commenters at 33 ("[I]f CLECs, unlike ILECs, are required to incur [substantial] additional and unnecessary equipment, space, and transport costs" in order to interconnect with ILECs, "they will be denied [any] meaningful opportunity to compete.").

providers of inputs to such carriers may not collocate "equipment necessary for interconnection or access to UNEs" just as carriers do.[44]

II. COMPETITIVE LECS ARE ENTITLED TO ACCESS THE FULL FEATURES, FUNCTIONS, AND CAPABILITIES OF THE LOOP, REGARDLESS OF THE LOOP ARCHITECTURE DEPLOYED BY AN INCUMBENT LEC.

The traditional loop plant is clearly changing, as incumbent LECs are deploying new loop technologies that enable them to utilize more efficient loop architectures. As discussed in Part A, however, the comments demonstrate that implementation of next-generation loop architecture does not change any of the fundamental legal and policy principles that have guided the Commission's definition of the local loop network element. Likewise, the new architecture does not diminish (and indeed, heightens) the competitive LECs' need for access to the entire loop. Part B below states that, contrary to some incumbent LECs' claims, preservation and enforcement of unbundling requirements will not discourage incumbent LEC investment in next-generation network architectures. Part C shows that the comments also clearly support AT&T's showing that no type of remote collocation -- whether physical, adjacent, or virtual -- can support broad-based competition or provide a viable basis for an exception to the incumbent LECs' existing loop unbundling obligations. Part C also shows that the commenters agree with AT&T that neither access to spare copper nor an incumbent LEC's offering of a "broadband service" is

[44] The *Local Competition Order* (¶ 611) is not to the contrary. That order did not address the question whether a non-carrier that provide inputs to carriers may collocate its equipment. Rather, the Commission merely held that it would continue its pre-existing *Expanded Interconnection* regime in place, on the grounds that the *Expanded Interconnection* regime was of broader scope (*i.e.*, enhanced service providers were permit to obtain collocation under the Expanded Interconnection regime, while Section 251(c)(6) collocation is limited to the operations of telecommunications carriers). While collocated equipment can only be used for a telecommunications carrier's interconnection or access to UNEs, as the *Local Competition Order* indicates, it does not follow that the carrier is the only party that can obtain collocation of that equipment.

a viable substitute for competitive LEC access to the entire loop, especially for the purpose of delivering a full array of telecommunications services to residential consumers.

The comments further demonstrate that if the Commission fails to adopt rules that recognize competitive LECs' continued need for access to the entire loop, the result will be drastically reduced prospects for competition for all telecommunications services, as discussed in Part D. Finally, Part E explains that the Commission's rules should be adjusted to recognize that the DSLAM's pure multiplexing functionality -- especially when deployed in a remote terminal loop architecture -- is part of the local loop element.

Incumbent LECs are deploying new loop technologies and architectures that improve service and network efficiency by incorporating much greater use of fiber; introducing splitting and additional signal conversion, encoding, concentration, and multiplexing functions at remote terminals; and adding decoding and demultiplexing at the central office and elsewhere in incumbent LECs' networks.[45] However, as AT&T and other commenters demonstrate, *nothing* in this new loop architecture changes the essential fact that the connection from the customer's premises to the central office is still a "loop."[46] The Commission's analysis in this proceeding therefore must adhere to the fundamental principles established in its prior decisions that define the loop element and preserve competitive access to all features, functions, and capabilities of the loop unbundled network element:

- *First*, the Commission has clearly and repeatedly held that the essential function of the loop is to provide transmission functionality between a customer's premises

[45] *See* AT&T at 37-43; Declaration of Joseph P. Riolo (Riolo Decl.) §§ 3A, 3B.

[46] *See* AT&T at 44-49; *see also* @Link at 2-5; DSLnet at 6-12; Focal at 26-29; Rhythms at 75-81.

and an incumbent LEC's central office, not between the customer's premises and an intermediate point such as a remote terminal.

- *Second*, the Commission has consistently and properly held that the loop functions as a transmission path and that the availability of the unbundled loop functionality is not limited to use for particular services or to the capabilities of specific technologies.

The Commission must view these principles – and the statutory bedrock in which they are grounded – as the paramount reasons that competitive LECs need, and are entitled to, continued access to the entire loop element. Indeed, failure to adhere to these precedents, or a finding that competitive LECs must use remote collocation when an incumbent deploys next-generation DLC in its outside plant, would ignore the statutory obligations Congress imposed on incumbent LECs and would be the death knell for mass-market competition, especially for advanced services.

In this regard, the Commission must not allow the incumbent LECs' obfuscations to cloud the pivotal competitive fact: if competitive LECs cannot access all of the communications signals sent over their customers' individual loops, competition for both local voice and data services will be stifled. The Commission's earlier decision declining to unbundle packet switching -- even in the face of a finding of "impairment"[47] -- relies on the premise that competitive LECs will have efficient and meaningful access to their customers' telecommunications signals at the incumbent LEC central office.[48] It is this access that AT&T and other competitive LECs seek to preserve here. Ironically, denying competitors unbundled access to the entire next-generation loop would, under the analysis in the Commission's *UNE Remand Order*, require full unbundling of packet-switching. Without access to the entire loop in a next-generation network -- which consists of copper distribution, the fiber feeder facilities

[47] The Commission found packet switching met the "impairment" standard, at least for most customers. *See UNE Remand Order* ¶ 306.

running from the remote terminal to the central office, and all associated loop electronics at the remote terminal and central office -- competitors will not have efficient and meaningful access to the signals necessary to offer competitive services. This, in turn, would require a complete reversal of the *UNE Remand Order's* analysis of packet-switching and the full unbundling of the packet switching element.

A. The Act and the Commission's Prior Decisions Require That Competitors Continue to Have Access to the Entire Unbundled Loop.

Except for the incumbent LECs, the commenters support AT&T's showing that the legal principles defining the unbundled loop element are straightforward.[49] Nevertheless, the incumbent LECs misread the law and attempt to confuse the analysis in an effort to block competitive LECs' ability to access the incumbent LECs' next-generation loop plant. Accordingly, it is imperative that the Commission reiterate the fundamental principles that have consistently guided its definition of the unbundled loop element. These principles fully support the competitive LECs' statutory right to access to the *entire* loop, regardless of the loop architecture an incumbent LEC deploys.

In the 1996 Act, Congress required incumbent LECs to provide requesting carriers with nondiscriminatory access to "a facility or equipment used in the provision of a telecommunications service," including all "features, functions, and capabilities that are provided by means of such facility or equipment."[50] Guided by this statutory mandate, the Commission

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[48] *See UNE Remand Order* ¶¶ 307, 313.

[49] *See* AT&T at 44-50; @Link at 2-5; Conectiv at 29-33; Corecomm at 40-42; CTSI at 29-35; DSLnet at 6-8; Focal at 26-29; Mpower at 40-42; Rhythms at 75-81; Telergy at 44-45.

[50] 47 U.S.C. § 151(29) (defining a "network element"); 47 U.S.C. § 251(c)(3) (discussing the duty of incumbent LECs to provide unbundled access to network elements); *see also Local Competition Order* ¶ 258 ("[w]e adopt the concept of unbundled elements as physical facilities

recognized that granting competitive LECs unbundled access to the local loop was paramount for the future of local competition, finding that "under any reasonable interpretation of the 'necessary' and 'impair' standards of section 251(d)(2), loops would be subject to the section 251(c)(3) unbundling obligations."[51]

The Commission has repeatedly recognized that there are two essential principles that lie at the heart of the definition of the unbundled loop element:

- *First*, the essential function of the loop is to provide *transmission functionality* needed for a customer to send and receive information between his or her location and the network of the service provider.[52]

- *Second*, and equally important, in order to support full-fledged competition, the local loop, as a transmission path, must be both service and technology neutral and must "apply *to new as well as current technologies.*"[53]

The law and its governing principles can be further distilled into a single, simple statement:

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of the network, together with the features, functions, and capabilities associated with those facilities"); *UNE Remand Order* ¶ 175 ("[t]he definition of a network element is not limited to facilities, but includes features, functions, and capabilities as well").

[51] *UNE Remand Order* ¶ 163; *Local Competition Order* ¶¶ 377-378 (providing access to unbundled local loops to competitive LECs is "critical to encouraging market entry," because "preventing access to unbundled loops would either discourage a potential competitor from entering the market, ... denying those consumers the benefits of competition, or cause the competitor to construct unnecessarily duplicative facilities, thereby misallocating societal resources").

[52] *See* 47 C.F.R. § 51.319(a) ("[t]he local loop network element is defined as a *transmission facility* between a distribution frame (or its equivalent) in an incumbent LEC central office and an end-user customer premises") (emphasis added); *Local Competition Order* ¶ 380 ("[t]he local loop element should be defined as a *transmission facility*") (emphasis added); *see also Line Sharing Order* ¶ 18 (competitive carriers "may access unbundled loop functionalities, such as non-voiceband transmission frequencies").

[53] *See UNE Remand Order* ¶ 167 (emphasis added); *Local Competition Order* ¶ 292 ("section 251(c)(3) requires incumbent LECs to provide requesting carriers with all of the functionalities of a particular element, so that requesting carriers can provide *any telecommunications services* that can be offered by means of the element") (emphasis added).

Competitive LECs are entitled to access an unbundled loop element that consists of all features, functions, and capabilities that provide transmission functionality between a customer's premises and the central office, regardless of the technologies used to provide, or the services offered over, such facilities.

Despite the incumbent LECs' attempts to confuse the issue, the straightforward analysis described above points the way for the appropriate treatment of next-generation loop technologies. Nothing about next-generation loop architecture changes the basic characteristics or functionality of the loop element. Nor does that architecture affect competitive LECs' right (or their compelling need) to access the entire loop as an unbundled element at the central office. As the Commission has properly held: "[u]sing the loop to get to the customer is fundamental to competition."[54] The incumbent LECs' comments do not support any contrary finding.

For example, SBC attempts to convince the Commission that the service neutrality principle does not exist. Specifically, SBC erroneously suggests that competitive LEC access to a loop can be limited to only those instances where the underlying transmission facility is used to provision *voice* services.[55] But both the Act and the Commission's implementing rules and orders show that SBC is flatly wrong as a matter of law.

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[54] *Line Sharing Order* ¶ 30; *see also UNE Remand Order* ¶ 171 (defining the unbundled loop element in such a way as to "ensure that the competitor will be able to gain access to the entire loop") (emphasis added); *Deployment of Wireline Services Offering Advanced Telecommunications Capability,* CC Docket No. 98-147, *Memorandum Opinion and Order, and Notice of Proposed Rulemaking*, FCC 98-188, ¶ 54 (rel. Aug. 7 1998) ("*Advanced Services Order*") ¶ 54 ("[t]he incumbent LECs' obligation to provide requesting carriers with fully functional conditioned loops extends to loops provisioned through remote concentration devices such as digital loop carriers (DLC)").

[55] *See* SBC at 59 ("[c]arriers are fully able to provide *voice service* as long as they have access to unbundled loops, which they do. . . CLECs can use the NGDLC architecture to provide *voice service*") (emphasis added). BellSouth makes a similar implication. *See* BellSouth 5th NPRM Comments at 13 (claiming that the Commission's decision to unbundle incumbent LEC loops cannot support UNE treatment of advanced services loops).

Neither the Act nor the Commission's discussions of unbundling of the loop network element make any distinction between the transmission functionality used to provide advanced data services and voice services. Indeed, the Commission has unequivocally held that the loop, as a transmission path, is service-neutral, finding, as a matter of fact and law, that there is "*no basis* for placing a restriction on what services a carrier may offer using the loop network element."[56] Thus, there is no restriction on the type of service a carrier may provide through the use of an unbundled loop, except that the service must be a telecommunications service.[57] Both voice and DSL services are indisputably "telecommunications services" and thus are covered by section 251(c)(3).[58] Accordingly, competitive LECs are entitled to access an entire unbundled

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[56] *UNE Remand Order* ¶ 177. BellSouth's comments notwithstanding (*see* BellSouth 5th NPRM Comments at 15), the Commission's decision not to unbundle packet switching does not mean that the Commission chose not to unbundle the basic *transmission functionality* necessary to offer advanced services. Indeed, the Commission's decisions to designate the high frequency portion of the loop spectrum as a separate unbundled network element and to require incumbent LECs to provide xDSL-capable loops are two recent examples where incumbent LECs must provide the underlying transmission functionality of the loop to competitive LECs for the provision of advanced services. *See Line Sharing Order* ¶ 18 ("carriers may access unbundled loop functionalities, such as *non-voiceband transmission frequencies*, separate from other loop functions, they are also 'entitled,' at their option, to exclusive use of the entire unbundled loop facility") (emphasis added); *UNE Remand Order* ¶ 190 ("[w]ithout access to these [conditioned] loops, competitors would be at a significant disadvantage, and the incumbent LEC, rather than the marketplace, would dictate the pace of the deployment of advanced services").

[57] *See UNE Remand Order* ¶ 177; *Local Competition Order* ¶ 292 (interpreting 251(c)(3) to bar "incumbent LECs from imposing limitations, restrictions, or requirements on requests for, or the sale or use of, unbundled elements that would impair the ability of requesting carriers to offer telecommunications services *in the manner they intend*") (emphasis added); *see also* 47 C.F.R. § 51.307(c).

[58] *See Advanced Services Order* ¶ 11 ("all incumbent LECs must provide requesting telecommunications carriers with unbundled loops capable of transporting high-speed digital signals, and must offer unbundled access to the equipment used in the provision of advanced services, subject to considerations of technical feasibility and the provisions of section 251(d)(2)"). The Commission recently reiterated this point, noting that "section 251(c)(3) permits access to those facilities not just for the provision of 'telephone exchange service' or 'exchange access,' but more broadly for the provision of a 'telecommunications service,' a category that ... includes the xDSL-based services." FCC Brief for Respondents at 21,

loop, irrespective of the telecommunications service that a carrier wishes to provide, and regardless of the underlying loop architecture the incumbent LEC uses to provide the loop functionality.

This is a critical time in the development of competition for advanced services, especially as the incumbent LECs begin rapidly to deploy next-generation loop technology.[59] The addition of next-generation electronics in the incumbent LEC's loop plant enables greater bandwidth to be transmitted between the customer's premises and the central office, but it does *not* change the loop's basic function of supplying transmission between the customer premises and the incumbent LEC's central office. And the central office remains the place where competitive LECs can practically and economically obtain access to their customers' telecommunications transmissions so that they can provide the telecommunications services of their choosing.[60]

As AT&T discussed in detail in its comments, next-generation loop electronics, such as line cards with DSLAM functionality and splitters: (i) determine how much information a customer can transmit/receive per unit of time; (ii) control communications with the service provider's network; and (iii) determine the efficiency (and therefore the cost) of facility use.[61] In sum, the next-generation architecture enhances the transmission functionality of the loop and

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WorldCom, Inc., et al. v. FCC, No. 00-1002 (D.C. Cir. filed Nov. 2, 2000) (FCC Appellate Brief).

[59] *See* Morgan Stanley Dean Witter Industry Overview, *Telecom-Wireline: DSL. . . It's Going Well* (Nov. 7, 2000) ("*Morgan Stanley DSL Report*") ("[w]e expect Q4 [2000] to show a dramatic acceleration in DSL deployment. We estimate 704,000 net adds by the big four, twice the installs of any previous quarter, and up 56% sequentially").

[60] *See* AT&T at 46; Riolo Decl. ¶¶ 42-45; *see also* @Link at 2-4; CompTel at 13; Conectiv at 29-30; Corecomm at 40-42; Mpower at 40-42; Rhythms at 66-81.

therefore is necessarily incorporated within the functionality of the unbundled loop network element itself.[62] Indeed, as Verizon readily admits, the electronics associated with the next-generation architecture "*simply provide[] a transmission channel* to facilitate delivery of specific services to the end user."[63]

The comments of both incumbent LECs and competitive LECs provide strong support for the fact that next-generation loops fall squarely within the Commission's definition of the loop network element. Indeed, BellSouth explicitly states that the incumbent LECs are deploying the next-generation architecture to create "*what is in essence a new loop network.*"[64] The competitive LEC commenters also demonstrate that next-generation architecture does not change the loop's essential functionality as a transmission pathway, nor does it reduce the critical competitive need to assure that such architecture is included within the definition of the loop element.[65]

In addition, commenters generally agree with AT&T[66] that the electronics associated with the next-generation loop architecture should -- indeed must -- be considered part of the loop. Specifically, the commenters explain that line cards with DSLAM functionality and

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[61] AT&T at 44-47; Riolo Decl. ¶¶ 48-64.

[62] *See UNE Remand Order* ¶ 175 ("[b]ecause excluding such equipment from the definition of the loop would limit the functionality of the loop, we include the attached electronics ... within the loop definition").

[63] Verizon at 35 (emphasis added).

[64] BellSouth 5th NPRM Comments at 21 (emphasis added).

[65] *See, e.g.*, AT&T at 44-50; Rhythms at 78-81 ("[n]ot only does the entire transmission facility between the central office and the end user remain a loop in the NGDLC network, the Commission has acknowledged that loops served over digital loop carrier can and should be unbundled as a single UNE"); *see also* @Link at 5; Conectiv at 30-31; CTSI at 31-33; DSLnet at 7-9; Focal at 27-29.

[66] AT&T at 56-64.

Optical Concentration Devices (OCDs) perform transmission-oriented functions when placed in next-generation loop architecture (*i.e.*, when transmission electronics are placed in the remote terminal that must work in conjunction with central office-deployed electronics).[67] For example, DSLnet states that line cards "are integrated, multi-functional equipment that play a vital role in the transmission of non-advanced, as well as advanced, services."[68] And even BellSouth explicitly admits "a '*line card' is an integral part of the loop*" when deployed in a remote terminal environment.[69]

Critically, the equipment manufacturers themselves support this view. Cisco Systems and Alcatel both confirm that the purpose of DSLAMs is to provide *transmission* functionality. Cisco clearly states that the primary function of a DSLAM is "multiplexing," and that the DSLAM also provides other *transport* functions, such as "the ability to forward the voice channels, if present, to a circuit switch, ... the ability to extract data units from the data channels on the loops, ... [and] the ability to combine data units from multiple loops onto one or more trunks."[70] Similarly, Alactel states that DSLAMs provide multiplexing functions and that "'[m]ultiplexing,' regardless of form, is a 'necessary' feature of electronic equipment used" for access to unbundled network elements.[71]

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[67] *See, e.g.*, DSLnet at 7-11; WorldCom at 9-10; @Link Networks at 5-7; Cisco at 8-10; Alcatel at 6-7, 12-13.

[68] DSLnet at 8-9 ("these integrated cards must be included in the definition of the loop because excluding them would limit the functionality of the loop"); *see also* WorldCom at 10 ("[w]ithout access to integrated voice and data card in DLC systems, CLECs are unable to offer a service that can be provided by ILECs, and thus cannot compete in the marketplace to provide consumer services").

[69] BellSouth 2nd NPRM Comments at 6 (emphasis added).

[70] Cisco at 8.

[71] Alcatel at 12.

The OCD is also a necessary component of the loop because it, in conjunction with the remote terminal DSLAM, is required in order to enable competitive LECs to access their customers' signals. In a next-generation loop configuration, remote terminal DSLAMs send individual customers' data packets in a commingled manner over a common feeder facility to the central office. Because the packets enter the central office in commingled form, there must be a means to extract and deliver the packets to the appropriate destination carrier. This function is performed by the OCD located at the incumbent LEC's central office. In this capacity, the OCD provides a demultiplexing/remultiplexing function that simply puts all the packets destined for the same carrier on the same facility.[72]

No carrier -- not even the incumbent LEC itself -- can identify its own traffic until *after* the commingled transmissions of multiple customers and multiple carriers have been demultiplexed. Likewise, the routing (*i.e.*, switching) of data packets to individual carriers' data networks does not -- and cannot -- occur until after this demultiplexing function has been performed. As Conectiv correctly states: "the OCD will be the only feasible point at which CLECs can get access to the ATM's bit streams coming from their customers"[73] because it is only at that point that traffic from an individual customer's data transmissions can be routed to his or her carrier's separate data network, including that carrier's packet switches. Thus, the end of the loop for data signals must be established at the network-side of the OCD (or similar device), *i.e.*, the first place a CLEC can access its customer's signals. It is also important to recognize that by allowing competitive LECs to access this limited functionality of the OCD, the

[72] AT&T at 61-62; Riolo Decl. ¶¶ 57-62.

[73] Conectiv at 33; *see also* @Link at 10; Corecomm at 44; Mpower at 45. Although Catena Networks maintains that the OCD is an ATM switch, it nevertheless confirms this point, stating

competitive LECs cannot benefit from any "switching" function that the OCD may also be capable of performing in other configurations that the incumbent LEC may design.[74] Thus, although competitive LECs need access to the demultiplexing functionality of the OCD to access their customers' "bits," they cannot use the OCD to provide an advanced service. Therefore, assuming that they are entitled to access the entire loop in the manner requested by AT&T in this proceeding, they have every economic incentive to invest in their own packet switching facilities to do so. Failure to be able to access their customers' "bits" in this way would have exactly the opposite result.

Thus, all of the electronics associated with NGDLC loops must be included in the loop element. Indeed, any other result would simply preclude competitive LECs from providing the same services the incumbent LEC (and its data affiliate) can offer. It would be impossible for competitive LECs to efficiently duplicate this configuration. An incumbent LEC can deploy one OCD to support all the remote terminals homing on a central office and all competitive LECs interconnecting at that office. If the OCD is not treated as part of the loop, however, *each* competitive LEC in a central office would be compelled to establish its own high capacity facility to *each* remote terminal where its customers' copper subloops are terminated. This would be extremely costly and wasteful of transmission capacity. More important, no individual carrier could justify building its own facilities to every remote terminal where it might otherwise wish to serve a customer.

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that the "DSL traffic is unbundled at the OCD and available to the data affiliate and competitive carriers via virtual circuits." Catena at 9.

[74] *See* Riolo Decl. ¶ 61.

Further, the addition of next-generation electronics does not change the Commission's determination that the customer's premises and the central office constitute the end-points of the loop. Despite incumbent LEC suggestions that the loop ends at the remote terminal instead of at the central office, the Commission has already ruled that the loop is "defined as a transmission facility between a distribution frame, or its equivalent, in an incumbent LEC *central office*, and the network interface device at the *customer premises*."[75] Moreover, the Commission has held that any intermediary points on the loop, such as the remote terminal, represent subloop endpoints, not the end of the loop.[76]

The incumbent LECs' other attempts to hinder competitive LECs' access to an entire loop should also be dismissed as contrary to established law. For example, some incumbent LECs incorrectly claim that the Commission must make a separate "impairment" determination before unbundling any "piece" of the entire loop.[77] BellSouth, for example, argues that the Commission "must apply its impairment test to advanced services and to newly deployed loop facilities."[78] These arguments fail for the simple reason that the Commission has clearly determined that the loop (including attached electronics) is a single UNE and that access to loops is essential in order for competitive LECs to have a meaningful opportunity to compete.

Moreover, the impairment test for the loop has already been satisfied; thus, there is no need to separately apply the impairment test to each variation in loop design, configuration,

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[75] *Local Competition Order* ¶ 380 (emphasis added).

[76] The Commission did not limit its determination of the accessible terminals that could form subloop end points. Rather, the Commission indicated that the subloop endpoints *may* include a terminal near the customer's premises, but may also include another location, such as the FDI, the MDF or the MPOE. *UNE Remand Order* ¶ 206.

[77] *See* BellSouth 5th NPRM Comments at 2, 9-10; SBC at 53-54.

or architecture. Indeed, the Commission has recently recognized that "whether a loop is used for conventional circuit-switched telephony or for the provision of an xDSL-based service link, it typically remains a quintessential bottleneck facility for competing telecommunications carriers."[79]

SBC and BellSouth also argue that the Commission should not require incumbent LECs to provide unbundled access to next generation loops because such a mandate would be inconsistent with the Commission's desire to refrain from regulating retail services.[80] This argument is fundamentally flawed because it ignores the inherent difference between the regulation of network infrastructure and the regulation of services provided over that infrastructure.

The loop facilities and other network inputs are merely raw material or components that carriers need in order to create any telecommunications service offering, including advanced services.[81] The end product is the xDSL or other telecommunications service that results from a provider's combination of these various components with its own

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[78] BellSouth 5th NPRM Comments at 10.

[79] FCC Appellate Brief at 22; *see also Local Competition Order* ¶ 389 (noting that the local loop has "the strongest bottleneck characteristics of any network element"). Even if the Commission determined that a separate impairment analysis was needed to address the next-generation loop architecture, the impairment test would certainly be met. *See infra Section* III; AT&T at 62-64; *see also* IP Communications at 5-8 ("in the case of NGDLCs, the impairment test is clearly met. Without unbundling, CLECs will be required to incur substantially higher costs that will make residential and small business customers unservable").

[80] *See* BellSouth 5th NPRM Comments at 20-22; SBC at 60-62.

[81] As the Commission has recently stated, "the most critical network facilities can support a wide range of services; the loop, for example, can be used to provide both conventional circuit-switched voice telephony and also (indeed, simultaneously) advanced telecommunications services such as an xDSL connection to a local area network or an Internet service provider." FCC Appellate Brief at 21.

facilities, strategies or ingenuity. The raw input material is only available from one source: the incumbent LEC. In contrast, the retail service offering is available from any provider able to access the raw inputs. As the Commission has aptly stated, "the elements in an incumbent's network are, in all respects relevant here, both conceptually and legally distinct from whatever 'services' an incumbent might happen to provide to its customers."[82]

Regulatory efforts are primarily, and most appropriately, directed at the stage in the product chain where the raw material is only available from one source.[83] As the Commission held, "[i]ncumbent LECs' ability to discriminate against retail rivals stems from their monopoly control over key inputs that rivals need in order to offer retail services."[84] It is for this reason that the Act and this Commission have focused on regulating the basic inputs, such as the loop, and *not* the resulting service provided over those facilities, because by ensuring access by all to the raw materials, the availability of multiple services from multiple providers is virtually assured.[85] The Commission has refused to muddle this analysis by looking to the resale of incumbent LEC services, such as SBC's Broadband Services, as a substitute for basic network inputs.[86] If those inputs remain unregulated and monopolized by only one entity, the retail

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[82] *Id.*; *see also id.* at 19-20.

[83] Indeed, the more appropriately the Commission regulates the inputs, the less the need for regulation of the retail services.

[84] *SBC/Ameritech Merger Order* ¶ 190.

[85] The Commission has consistently recognized that competition cannot succeed unless competitors have the same ability to use the incumbent LECs' loops to their customers' premises, regardless of the technologies used or the services that competitors seek to provide over those lines. *Local Competition Order* ¶¶ 381-383, 385; *Advanced Services Order* ¶ 11, 46-49; *see also* FCC Appellate Brief at 19-21.

[86] "We assign little weight in our 'impair' analysis to the ability of a requesting carrier to use the incumbent LECs' resold or retail tariffed services as alternatives to unbundled network elements." *UNE Remand Order* ¶ 67.

market for the end product, whether voice or data services, will invariably be distorted.[87] These principles have been the heart of the 1996 Act and ensuing orders to date, and there is no basis to change them now.

Further, Congress' statutory mandate was purposely focused on incumbent LECs and Congress adopted unbundling, interconnection, and other requirements on incumbent LECs in order to break open their local telephone monopolies.[88] Moreover, Congress had good reason to subject incumbent LEC advanced services facilities to section 251(c). Freeing incumbent LECs from their section 251(c)(3) obligations over such facilities would further entrench their voice monopolies. Consumers are increasingly demanding voice and high-speed data services over a single line. Incumbent LECs are already satisfying that demand today and have made it clear that they consider the ability to offer bundled voice and data services a significant competitive advantage. If UNE-based new entrants are denied access to local loops for advanced services, they simply would be unable to compete for consumers that increasingly demand a single voice/data offering. Congress adopted section 251(c) to prevent incumbent LECs from leveraging their bottleneck monopolies into nascent advanced services "offered over the same

[87] It is for this reason that the Commission should ignore BellSouth and SBC's arguments to deny access to the entire loop based on claims that the incumbent LECs are less able to exert bottleneck control over the advanced services market. BellSouth 5th NPRM Comments at 13-14; SBC at 2. Any service, whether analog voice or packet-based, must be carried from a customer's premises to a central location, typically the incumbent's central office, via the incumbent's local loops.

[88] At the time of enactment, incumbent LECs controlled 99% of the local telephone market.

bottleneck facilities."[89] Thus, the Commission should reject incumbent LECs' efforts to avoid that mandate.[90]

B. Incumbent LECs' Investment in Next Generation Loop Architecture Will Not Be Impaired by the Commission's Enforcement of Their Existing Statutory Unbundling Requirements.

Both SBC and BellSouth claim that incumbent LECs will have little, if any, incentive to invest and deploy next-generation loop architecture if they are obligated to provide unbundled access to newly deployed electronics and equipment that enhance the delivery of advanced telecommunications services.[91] These arguments are simply not credible; moreover, they have no support in either law or policy and must be rejected. SBC's and BellSouth's claims reflect nothing more than a back-door attempt to evade basic statutory obligations that were carefully designed by Congress to promote competition in the provision of local telecommunications services. The Commission should reject their arguments as a thinly veiled attempt by the incumbent LECs to expand their local telephone monopolies to advanced telecommunications services.

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[89] FCC Appellate Brief at 27.

[90] *See* BellSouth 5th NPRM Comments at 20-21; SBC at 3, 56-57. Contrary to SBC's claims, the "Commission's rules" that place burdens on the incumbent LECs -- such as the "restrictions imposed by 47 U.S.C. § 271" -- are not discretionary, but, rather, are rules that implement statutory language that Congress *consciously* enacted to apply *only* to incumbent LECs, or, in the case of section 271, to Bell Operating Companies. *See also* Joint Commenters at 30 (Collocation requirements will only be effective if, once CLECs have made a minimal showing of "necessity," the "burden [is placed] on the ILEC to demonstrate that collocation of such equipment should not be allowed.").

[91] SBC at 56; BellSouth 5th NPRM Comments at 20-21.

As a threshold matter, the BOCs' arguments are belied by their own vigorous investment strategy.[92] Such investments advance the BOCs' own business plans, and will proceed without regard to whether they must continue to unbundle the local loop. Indeed, these investments enhance the incumbents' (and their affiliates') ability to make more efficient use of the existing loop plant to provide higher-quality voice and advanced telecommunications services (and new services) to more consumers, and generate significant new revenues in the bargain.[93] These initiatives are clearly an effort to capitalize on the anticipated explosive growth of data traffic on their networks and will continue regardless of the Commission's decision here.[94]

Second, BellSouth claims that its deployment of next-generation loops "depends on being able to reap some financial upside beyond the retail revenues from selling voice and

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[92] *See, e.g.*, Duane Ackerman, *Take Another Look at BellSouth*, Remarks at Goldman Sachs 2000 Communicopia IX Conference at 4 (Oct. 4, 2000) ("Ackerman Remarks") ("[w]e have the most robust local network in the U.S., if not the world. Through prudent and consistent levels of investment, we are leveraging this asset by systematically transforming the network to digital broadband and IP. This targeted capital program has put 96 percent of our customers within 12,000 feet of fiber in our top 30 markets"); SBC Communications, *Strong Data, Wireless and Long-Distance Operations Highlight SBC's Third-Quarter Results*, Investor Briefing at 4 (Oct. 23, 2000) ("SBC Investor Briefing") ("SBC continues to make solid progress in developing next-generation broadband networks," because "[d]emand for DSL continues to be very robust"); *Verizon Posts Strong Third Quarter Revenue Growth on Sustained Demand for High-Growth Services* (Oct. 30, 2000) <http://newcenter.verizon.com/proactive/newsroom.vtml?id-44828> ("*Verizon 3Q Results*") ("[w]ith 3,500 DSL installations a day, we're on track to meet our year-end target of 500,000 DSL customers" (quoting Verizon Chairman and co-CEO, Charles R. Lee). "With the premier set of local wireline ... assets in the industry, we have the right platform -- a fiber-rich, data-centric network architecture -- on which to build a truly integrated bundle of broadband communications services" (quoting Verizon President and co-CEO, Ivan Seidenberg)).

[93] *See, e.g.*, AT&T at 40-41; Rhythms at 68-69; Catena at 2; Conectiv at 29; WorldCom at 15-16; DSLnet at 8-9.

[94] *See, e.g.*, Ackerman Remarks at 8 ("[l]et me talk about growth in the network today -- in other words, data growth. Data already represents more than half the traffic on our network, and by 2008 we project data will be 90 percent. So the growth is almost built-in").